UNITED STATES DEPARTMENT OF AGRICULTURE
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SHADING ON A PRINTING MACHINE [1]

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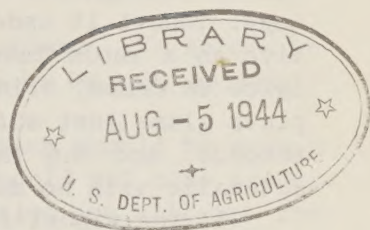
One of the most neglected phases of photography, among both amateurs and professionals, is that of proper shading during printing. A certain amount of shading can be done with printing frames, although the subject is generally too indistinct for anything like accurate manipulation, but it is the numerous stunts which can be performed on a printing machine of which I wish to speak.

Of course we all know about placing tissue paper on the opal glass for holding back certain areas, but suppose one sheet is not sufficient and two hold the light back too much. Suppose that the top of a bald head caught a sunbeam and the rest of the group were in shadow. What then? How often have you struggled with an outdoor mother and baby portrait to keep mother from doing a fadeout while printing out the white blotch supposed to be the baby? Suppose you have a large order from a group containing a couple of bald heads and a baby as well, each requiring a different amount of overprinting. The answer is, slap on the softest paper you have and let it go at that.

These are but a few examples of what every photographer encounters from time to time, and it is so simple to improve the results by certain manipulations on the printer that a few words in regard to the methods which I have had to adopt from force of necessity might be helpful to others.

In my work for Uncle Sam in photographing insects and nature subjects in general it is unusual, even with the best combinations of plates and screens and lighting equipment, to make a negative so perfect that it cannot be improved with a certain amount of shading.

Most of you doubtless have resorted to intricate methods of local reduction and intensification, entailing hours of labor with perhaps indifferent results, but if you could see hundreds of negatives that pass through my hands that have been so treated, years ago, by presumably professional photographers, and could note their almost worthless condition from deterioration, you would be inclined to adopt some other method.

Of course we would only resort to shading on a negative which we consider worth while. The kodak finisher couldn't be bothered unless he had a large order from a single negative, dependent upon securing certain results.

But to get down to cases. Suppose we are using tissue paper, either a small piece to hold back an interior section, or a large piece with a hole cut in it to print out a certain part--and we find that one piece is not sufficient and

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two are too much, we can cut an appropriate mask out of ordinary paper, a page out of a magazine will do, attach a paper handle with paste or lantern slide tape; insert it under the plate glass and register the negative. If the negative as a whole takes ten seconds, and the portion to be brought out is about twice as dense, bring down the lever for ten seconds, release lever; tip up the plate glass just sufficiently to withdraw the mask; press lever for another ten seconds, and the thing is done. The process of double printing soon becomes automatic with no more guesswork than printing two separate negatives.

If the vignetting stretches out too far, prop a piece of clear glass on top of the opal or ground glass with four sections of cork, bringing the mask up closer to the plate glass. When the mask is just about in contact with the underside of the plate glass the diffusion will extend about one quarter of an inch.

Every case is different and the proper depth for the mask must be approximated in order that the vignetting will merge just right into the picture and show no signs of faking.

Suppose you photograph a series of bookracks, a cedar chest, or other long object, lighted by a window at one end. Your negatives will be dense at one end and graduated off to almost nothing at the other.

Ascertain the exposure for the dense portion and place a mask under the entire negative. If your exposure is 10 seconds, take 10 seconds in withdrawing the mask. Of course, this necessitates using at least an 8 × 10 printer for 5 × 7 negatives; a larger printer is even better. A little piece cut out of the plate glass support will facilitate the insertion and withdrawal of the half-inch paper handle. If your printer is a small one, remove the ground glass and place cardboard over bulb, covering up two-thirds of the light source.

Suppose a single face in a group, or other small area, is in deep shadow and a coating of crayon or prussian blue fails to correct the difficulty.

Fasten a small mask on a cork of sufficient height to bring it almost in contact with the underside of plate glass. If the area is very small the cork can be tapered to allow sufficient base and still not cut off the light. The cork can be withdrawn at the right moment with a thin, flexible wire, as indicated in diagram.

In case the negative, besides requiring shading in one or more places, is graduated in density, the lights on one side can be turned off, or a cardboard on top of the bulb can be used as suggested above.

The above suggestions bring nearly all shading requirements thoroughly under control. They do, however, take more or less time which I cannot spare and some years ago, therefore, I constructed a printer which not only does all this work quickly, but it is adaptable to all kinds of work, including kodak finishing and portraiture.

For the benefit of those who wish to go deeper into the matter of shading, and who would like to have an inexpensive printer which will answer all purposes as well as if not better than any of the commercial variety, I will give full specifications. The entire outlay in cash should be under ten dollars, and it can be knocked together in a few evenings' work.

The difficulty with most f the commercial printers is that the opal or ground glass is not placed far enough below the negative to allow of certain manipulations. This is taken care of in the printer I am about to describe.

For extremely difficult work this machine permits you actually to look through the negative during the process of shading.

The main idea is to have the ground glass at least five inches below the negative, with an opening in front of the table to permit hand manipulation of various kinds of masks.

It is probable that you already have a table that will answer. It should be at least two feet wide and three feet long. If not, it will be an easy matter to construct one.

Two twelve-inch dressed boards will do for the top, which should be braced to maintain a clean, flat surface. The braces, however, should not come closer than six inches to each side of the 5 × 7 or other opening which you will cut for the well of the printer.

The machine can be operated while either sitting or standing, and if you lower the table sufficiently, you will be able to use it in either position. Shading is best done while sitting.

If you print mostly from kodak negatives, a 5 × 7 opening will answer, although an 8 × 10 opening costs practically the same and is adaptable for such a wider range of work that it would be worth while to make the larger printer.

All that is needed outside of the table is about three feet of pine or other board, 8 inches wide by $\frac{1}{2}$ inch thick; another $\frac{1}{2}$ inch board 9 × 13 inches (for the 5 × 7) or 12 × 16 inches (for the 8 × 10); a 10-inch porcelain reflector (or 12-inch for an 8 × 10). The reflector should be adaptable for a mogul socket to take a three or four hundred watt lamp; about a 12 watt bulb and socket for the pilot light; a floor switch; a pair of hinges with one strap at least three inches long; and the back out of one of the heavy, better class printing frames.

First make the lamp frame (B) 21 inches deep, with a one-inch board across the bottom for the sake of firmness. Have it fit the reflector at the top and slant towards the bottom to give leg room. The frame is held together with two side strips (R).

At the top of the frame place cross-pieces (M) with a hole bored in each end for screwing the frame to the table top. Place runners to hold ground glass (N) about an inch above reflector, allowing ventilation. For tissue paper shading place another runner either on frame or under side of table to hold a sheet of clear glass (X).

You are now ready to cut the opening in the table. Hold the lamp frame in the proper place, as close to the front of the table as possible, and take measurements for the opening to center over the bulb. If for a 5 × 7 printer, cut the opening at least an inch larger all round; an 8 × 10 opening is sufficient for an 8 × 10 printer. The opening does not have to be clean and accurate as the printing top, plate glass, etc., are all fastened into a smooth half-inch board on top of table.

Cut an opening in the board (K) slightly nearer the front end and countersink the plate glass so that it is flush. The cloth already on the printing frame back answers fairly well if you use films only. For either films or plates, glue on a piece of at least $\frac{1}{4}$ inch felt and slit the joint slightly V-shaped.

The board is fitted at (Y) to take hinges at the proper height to allow the felt to make good contact with the glass under pressure of the hand. Hinge straps will take a two-inch grip on the printing top and allow a clearance of one inch at (J) to throw it up out of the way when lifted. Fit bumper (I) and

flexible spring (T) which automatically swings the top up when the hand is re-moved. A chain of 1/8 inch rubber bands answer well for this. A strip of molding (S) on the front of the printing top will provide a grip for the hand.

The felt and the long swing of the 8 × 10 top takes care of all size films and glass negatives up to 5 × 7. The smaller printer will take glass only up to about 4 × 5, and if 5 × 7 glass negatives are to be printed a thinner plate glass should be kept on hand to allow for the extra thickness of these negatives.

You can now center the plate glass over the bulb and place the socket for pilot light in front of light frame about a quarter of an inch to the left of light-well opening, and as low as possible without cramping the bulb against ground glass.

There are various makes of floor (or door) switches, but most of them burn out in the course of a few months. The one made by General Electric Co. and marked "5A250V-25A-VSP," however, can be used for years without replacement. It is a round switch, $2\frac{7}{8}$ inches in diameter and 2 inches high. Get the kind that makes contact when the button is pressed. This switch costs one dollar and a half.

Fitting the switch on a block with a tin-hinged foot-board (Q) is so sim-ple that no explanation is required. If switch-button does not protrude suf-ficiently, a half-inch plunger can be fitted on the underside of the foot-board.

A hand hole at least 4 inches in diameter should be cut in front of the table at the right (0). Place an upright strip on table from front to back (U) to prevent slopping from the trays, and if table is not long enough to accom-modate these, a hinged extension can be made as seen at (V).

A series of shelves at back of table (L) is a necessary part of the printer, and should accomodate at least a half dozen boxes of assorted paper. When all this has been done we are ready for the wiring and a coat of varnish.

Secure sufficient length of heavily insulated flexible cable to reach from the switch through the two bulbs, to your wall socket. The cable goes to both poles of the pilot light which is always lighted; thence to one side of large bulb; down to one side of switch; and thence from the other side of the switch up to the other side of large bulb, completing the curcuit when the switch makes contact.

To operate the printer place the paper on the negative; then bring down the top and press the foot-switch; release switch, top automatically flies back, and both hands are free for the next print. It is as fast for kodak work as any of the expensive machines. For portrait work it can be slowed down if neces-sary with a sheet of tissue paper.

All that is required for a negative of uneven density is to cover up from one-half to two-thirds of the ground glass with a sheet of paper.

When shorter vignetting is desired, as, for instance, in holding back the sky, hold a piece of paper cut to sky-line anywhere from contact to an inch or more under plate glass according to the amount of diffusion required. Expose thus as long as necessary and then quickly withdraw mask without releasing switch. The shading required and the proper diffusion soon become automatic and take practically no more time than printing in the usual way.

To cut masks, place a sheet of ordinary paper over the negative and if the latter is dense, turn on the light. Mark area to be printed and cut out with small pointed scissors. In extreme cases it might be necessary to transfer this to a sheet of opaque paper.

If a very small area is to be held back, attach a mask with a thumb tack at an angle to the rubber end of a pencil. Register this in contact with the under side of plate glass and hold in that position while you place paper and complete the printing.

The double printing soon becomes second nature and you will be surprised, not only at the small amount of time consumed, but at the perfection with which the shaded or overprinted portion merges into the rest of the photograph with no suggestion of manipulation.

But the emergency for which this printer was designed was in cases requiring overprinting not of one, but of several small areas in the same negatives, some requiring more than others.

To accomplish this, hold paper in contact with a sheet of clear glass with left hand. Now, by using a mask larger than the negative with a small hole cut in the center, you can control a point of light of any size on any portion desired, and actually see the amount of diffusion you are getting during the process. You actually paint the picture where necessary with beam of light which is at all times thoroughly under control.

My work probably calls for more shading than that of most photographers, but even so, it should be a source of pleasure to know that you are equipped to meet any emergency that may arise.

Explanation of Illustrations

Figure 1.--Diagram showing construction of printing machine.

Figure 2.--Sketch showing method of shading small inside area of negative on a commercial printer with short grade diffusion.

Figure 3.--General arrangement of printing machine.